Great Lakes Dredge & Dock Company

Capping Plan

Lower Passaic River Study Area Project
Dredging / Solidification / Capping Services

Capping Plan rev6			
DREDGING, STABILIZATION AND CAPPING RIVER MILE 10.9 TCRA			
Submittal Number:	4	Specification Number:	02 32 00
		Paragraph :	1.03
GLDD Reviewer:		Todd King	
Date of GLDD Approval:		10/21/13	
We certify that the submittal has been reviewed, checked and approved for compliance with the Contract Documents			

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1.0 Introduction

Once all dredging has been completed, GLDD will install a multi-layer cap covering the dredged area. The cap in the majority of the Removal Area will consist of a ten-inch blended layer of 70% (v/v) sand and 30% (v/v) AquaGate+PAC™, followed by a single layer of non-woven 100% plastic high strength dimensionally stable geotextile, a twelve-inch layer of Type A armor stone and a final habitat layer of sand.

In some near shore areas, very hard-packed material comprised of weathered stone, clay and cobble was encountered which prevented excavation of 2 feet of sediment. As a result, a reduced thickness cap with be installed in those high sub-grade areas. This reduced thickness cap will consist of a six-inch blended layer of 70% (v/v) sand and 30% (v/v) AquaGate+PAC™, followed by a single layer of non-woven 100% plastic high strength dimensionally stable geotextile, a six-inch layer of Type B armor stone and a final habitat layer of sand.

Capping operations will be performed with some of the same equipment utilized for the dredging works, plus various pieces of other equipment unique to the operation. The dredge barge will be slightly modified in support of the capping operations, while a separate deck barge will be mobilized to the site to support the blending and placement equipment required for the combined sand/active material layer. A conceptual layout of capping equipment can be found in Attachment 1.0.

GLDD will employ the use of a combination of GPS locating equipment, transducer soundings, settlement plates and core samples to ensure complete coverage to the specified layer thicknesses. The cap installation will be initiated at the downriver location (south) and continue upriver working from shoreline to channel. The introduction of the material into the water column will be performed in a low energy/controlled manner to avoid loss of material and excess turbidity during installation. Water quality monitoring will be performed in real time and Best Management Practices (BMP's) will be utilized, as needed, to minimize the suspension of sediments.

2.0 Capping Equipment/Personnel

The execution of the capping scope of work requires the use of specialized equipment and experienced personnel. The personnel consists of operational and technical staff that possess multiple years of combined experience and are very familiar with the project due to a thorough review of the project specifications, drawings and site characteristics. The following defines a summary of personnel and equipment scheduled to perform the scope of work as it relates to the dredging of sediments. A more detailed description of the equipment follows the summary below:

<u>Project Personnel</u>
1-Project Manager
1-Capping Supervisor
1-Health and Safety Officer/Quality Control Supervisor
1-Project Engineer
2-Site Engineers
3-Local 825 Operating Engineers

1-Local 25 Deck Captain
1-Local 25 Mate

Project Equipment

1-Material Handler
2-Material Transport Barges
1-Modified Dredge Barge
1-Capping Deck Barge
2-Deck Barges
1-Telebelt TB 130 Mobile Belt Conveyor
1-CAT 320 Long Reach Excavator
1-2-Bin Feeder/Incline Belt Conveyor
1-RTK/GPS Positioning System
2-2400 hp, twin screw Tugboats w/operators
1-450 hp, twin screw Tugboat w/operator
1-Sealand Container w/generator-office
1-Sealand Container-spare parts
1-Survey Boat
Spud winches/Power Pack
Signage/Navigation Lighting
1-Portable Sanitary Facilities

Equipment illustrations and specifications can be found in Appendix 1.0.

3.0 Mobilization/Site Set Up

Once all specialized capping equipment has been secured to the deck barges, GLDD will mobilize to the site. As with dredging mobilization, GLDD will provide the bridge operators/engineers with a mobilization schedule inclusive of a bridge opening request schedule. GLDD will be mobilizing all equipment required to perform the work, exclusive of material barges that will be mobilized to the site following the tugboats exit from River Mile 10.9.

Once mobilized, site set up will commence. This will consist of the following:

- Turbidity Buoy Deployment-GLDD will install the four turbidity monitoring buoys at the specified WQMP locations with the installation of the 5th mobile buoy in a position that is dictated by the location of the turbidity barrier.
- Barge Mooring Anchor Installation-GLDD will install two material barge mooring anchors and floats at the designated equipment mooring location used for the dredging portion of the work.
- Turbidity Barrier Installation- GLDD will install a turbidity barrier system in compliance with the Water Quality Management Plan.

4.0 Capping Materials

The capping of the dredged areas consists of the installation of four distinct layers. The following is a description of each layer to be installed from lowest to highest layer. The layers are as follows:

- Sand/AquaGate+PAC™ Blend-The capping layer to be applied over the dredged surface consists of a blended mixture of sand/active material layer, in a 70%/30% mixture by Volume (v/v) respectively. The sand material will be a medium to coarse sand (USCS Classification SW or SP) with no more than 1 percent passing the Number 200 sieve (P200). Clean, hard, durable imported material, free from foreign materials with a minimum specific gravity of 2.5. The sand gradation as determined in accordance with ASTM C117 and ASTM C136 as follows:

Sieve Size	% Passing
3/8 in.	100
#4	95–100
#8	80–100
#16	50–85
#30	25–60
#50	10–30
#100	2–10
#200	0–1

Prior to delivery on site, GLDD will provide the results of one representative gradation test (ASTM D2487) per 1,000 cubic yards from the sand source. In addition to the gradation testing, a chemical analysis will be performed according to the certification and testing requirements established by the USEPA to certify the material meets requirements prior to placement of the sand cover. The analytical testing includes:

1. TAL metals (excluding mercury) and titanium using EPA Method 6010C/6020A
2. SVOCs using EPA Method 8270C
3. PAHs and alkyl PAHs using a laboratory-specific SOP based on California EPA Air Resources Board Method 429 and NOAA ORCA 130 Method
4. PCBs (homologs and congeners) using EPA Method 1668A
5. PCDDs/PCDFs using EPA Method 1613B
6. Organochlorine pesticides using a laboratory-specific SOP based on USEPA Method 1699
7. Chlorinated herbicides using EPA Method 8151A
8. TPHs (extractable) using NJDEP Method OQA-QAM-025-02/08
9. Butyltins using a laboratory-specific SOP based on Krone 1988
10. Mercury, low-level using EPA Method 1631
11. Cyanide using EPA Method 335.2
12. VOCs using EPA Method 8260B

The reactive material to be blended with the sand is commercially referred to as AquaGate+PAC™ (Powdered Activated Carbon). This is a patented composite aggregate resembling small stones comprised of a dense aggregate core, clay or clay sized materials, polymers and fine grained activated carbon additives. The material will be manufactured in Ohio, packaged in one cubic yard supersacks and transported by tractor trailer to Amboy Aggregates located in South Amboy, NJ. The material will be stored in the sacks fitted with pallet covers and covered with waterproof tarps secured with sandbags. The material data sheet can be found in Attachment 4.0

- Geotextile-Following the installation of the sand/AquaGate+PAC™ layer, GLDD will install a single layer of non-woven 100% plastic high strength dimensionally stable geotextile. The geotextile will be purchased in 15'x 480' rolls and stored at the GLDD Staten Island yard. Opening size, permittivity, UV resistance, and strength properties meeting the following Geotextile Properties and Applicable Standards:

Property	Test Method	Units	MARV
Grab Strength	ASTM D 4632	N	1400
Sewn Seam Strength	ASTM D 4632	N	1260
Trapezoidal Tear Strength	ASTM D 4533	N	500
Puncture Strength	ASTM D 6241	N	2750
Permittivity	ASTM D 4491	sec-1	0.5
AOS	ASTM D 4751	mm	0.5
UV stability (retained strength)	ASTM D 4355	percent	50 (after 500 hours)

The geotextile data sheet can be found in Attachment 4.1.

- Armor Stone-Following the installation of the geotextile, GLDD will install a layer of armor stone to deter erosion of the previous layers installed. The armor material will be clean, hard, angular, durable imported material that is free from foreign materials with the following physical properties:
  - Bulk specific gravity (SSD) > 2.65
  - Absorption < 2 percent
  - Resistance to Freezing and Thawing, maximum loss < 10 percent
  - Resistance to Wetting and Drying, maximum loss < 1 percent

  Required performance evaluation tests on stone samples will conducted under the direction of a registered geologist or engineer. All tests will be subjected to:
  - Petrographic examination (ASTM C295)
  - Bulk specific gravity (SSD)
  - Absorption (ASTM C 127)
  - Resistance of stone to freezing and thawing (ASTM D 5312)
  - and if argillaceous limestone and sandstone are used, resistance to wetting and drying (ASTM D 5313) to meet the above requirements

Required Gradation (as determined in accordance with ASTM D5519).

- Type A Armor - average thickness of 12-inches and to minimum thickness of 10-inches.
- Type A Limits of Stone Weight (lb) for Percentage Lighter by Weight

100% lighter by wt.		50% lighter by wt.		15% lighter by wt.	
Max.	Min.	Max.	Min.	Max.	Min.
23 lbs.	9 lbs.	7 lbs.	5 lbs.	3 lbs.	1 lb.

- Type B Armor - average thickness of 6-inches and to minimum thickness of 4.5 inches.
- Type B Limits of Stone Weight (lb) for Percentage Lighter by Weight

100% lighter by wt.		50% lighter by wt.		15% lighter by wt.	
Max.	Min.	Max.	Min.	Max.	Min.
2 lbs.	0.8 lbs.	0.6 lbs.	0.4 lbs.	0.3 lbs.	0.1 lb.

Testing results from the armor stone source will be provided prior to the delivery of the stone to the site with one representative series of evaluation tests specified in this Section per armor stone (riprap) source.

- Sand Habitat Layer-Following the installation of the Armor Stone layer, GLDD will install sand with the identical properties as the sand used in the sand/active material layer, without the AquaGate+PAC™ . The sand will be installed to fill voids within the installed armor stone resulting in a smooth surface that just covers the armor stone.

5.0 Capping Operations

The following sections describe the operational approach to be utilized for the installation of the multi-layered cap as well as the engineering controls to be employed.

5.1 Turbidity Curtains/Controls

All capping activities will be conducted, in accordance with the approved WQMP, using acceptable Best Management Practice (BMP) to manage potential re-suspension during capping operations. The silt curtain systems will be flexible and adaptable to both the environmental conditions of the river as well as all activities associated with capping. These silt curtains will be constructed of PVC sheeting that is weighted on the bottom and suspended from marine-quality flotation boom. Ballast chains/weights will be connected to the curtains via shackles or hooks and aluminum extrusion end connectors will be adjoined and toggle pins inserted. Finally, the grommet eyes of each curtain section will be adjoined to the adjacent curtain to render the curtain continuous beneath the water.

The curtains will be installed as per the manufacturer's recommendations that include deployment with curtain sections retracted (furled/reefed up) once sections have been connected. The terminal ends of the silt curtain will be anchored at the shoreline using concrete ballast blocks and/or tie off points and

secured in the river using anchored pontoons. The installed curtain will be continuously monitored for effectiveness and damage.
In addition to the silt curtain system, turbidity will be continued to be monitored per the approved WQMP and following Best Management Practices (BMP) will be employed during the capping operations:

- Monitor the river velocity/curtain behavior and suspend operations should the turbidity monitoring instruments exceed the allowable prescribed parameters. The installed curtain also demonstrates a safety factor for the allowance of storm events that will typically increase current flows
- Low energy placement of materials
- No "re-handling" of material on the river bottom
- Avoid grounding of marine vessels and allowing water levels to rise before attempting to free grounded vessels
- Minimize the number of trips by support vessels
- Restrict the draft of workboats and barges
- Restrict navigational speeds
- Restrict the size and power of workboats and restrict throttle speeds in the Capping Area
- Monitor the water quality beyond the silt curtains during capping operations

5.2 Sand/Aquagate Installation

The AquaGate+PAC™ product is considerably larger in size (approximately ½ inch diameter) than the fine sand particle. As a result of this large size difference between the two materials, it is very difficult to produce and maintain a blended mixture of the product. For example, when the two materials are discharged into a stockpile from a conveyor, the cone shape of the stockpile causes the larger diameter AquaGate+PAC™ pellets run along the side of the tightly packed sand pile. As a result the AquaGate+PAC™ pellets separate from the sand and end up at the bottom of the pile. Making the application even more difficult is the friable nature of the pellet. Handling and mixing of the pellet needs to be minimized to keep the AquaGate+PAC™ pellets from breaking apart. To produce an uniform mixture of 70% sand and 30% AquaGate+PAC™ (by volume) for placement as a combined sand/reactive material layer, GLDD has developed the following approach/plan:

1. The combined sand/reactive layer will be installed in thicknesses as defined in the Technical Memorandum-High Subgrade Cap Design (Att. 6.0) dependent upon area being capped.
2. The AquaGate+PAC™ product will be produced in Swanton, Ohio and trucked to the Amboy Aggregates South Amboy, NJ facility on flatbed truck in super one cubic yard sacks.
3. At Amboy Aggregates, the super sacks will be stored and wrapped in plastic sheeting to protect the product from the rain.
4. From Amboy Aggregates the super sacks of AquaGate+PAC™ will be loaded onto barges and transferred to the job site at RM 10.9 on the Passaic River.

5. The sand required for the combined sand/active layer material cap will also be transported via sand barge to the job site.
6. A separate capping equipment barge will be assembled for all of the capping equipment required for placement of the combined sand/active layer. See Attachment 1.0 Preliminary Capping Equipment Layout drawing attached.
7. The capping equipment will consist of the following equipment:

    a. Two Bin Feeder-required for the blending and feeding of sand and AquaGate+PAC™ mixture onto the Telebelt. The system consists of two feed hoppers, two belt feeders, inclined belt conveyor, electrical switchgear, diesel engine to power the conveyors and controls mounted on an outdoor electrical panel.
    b. Long Reach Excavator-required for loading of the AquaGate+PAC™ into the hopper.
    c. Telescopic Belt Conveyor-required for the placement of the combined sand/active material layer. The system consists of a Putzmeister Telebelt TB130 belt conveyor, RTK/GPS positioning system and Dredge Pack Software modified for the Telebelt operation.
    d. Deck Barge-required to support the two bin feeder, incline belt conveyor, Telebelt and long reach excavator. Unit will be a Weeks Marine #186 ABS Deck Barge or similar with dimensions of 150'x40'x8'.
    e. Dredge Barge-required for unloading of the material barges and transfer of sand to the two bin feeder. The system consists of a Fuchs 380 material handler with clamshell bucket, two double drum winches, three spuds and office/support equipment.
    f. ABS Deck Barges-required for transfer of the AquaGate+PAC™ from Amboy Aggregates in South Amboy, NJ to the site. Units will be two Weeks Marine ABS Deck Barges or similar with dimensions of 150'x40'x8'.
    g. Material Barges-required for transport of sand from Amboy Aggregates in South Amboy to the site. Units will be two DOS Hopper Barges with dimensions of 150'x37'x10'6".
    h. Dredge Tender-required to support capping operations and movement of the capping equipment on site. Tugboat will be the Harbor II with specifications of 45-foot LOA and 450-horsepower
    i. Tug Boats-required for transport of material barges from Amboy Aggregates in South Amboy, NJ to the site. Tugboats will be the Specialist ll, Eastern Dawn and Mister Jim. All possessing horsepower of 1300-2600.

8. Super sacks of AquaGate+PAC™ will be loaded from the transport barge onto the deck of the capping barge for staging and/or direct loading into one of the two feed hoppers on the two bin feeder using the long reach excavator.
9. The Fuchs 380 material Handler on the dredge barge will be used to transfer sand from the material barge into the other feed hopper on the two bin feeder.
10. Each feed hopper will be equipped with an adjustable discharge gate that will control the feed rate of material that is discharged from each hopper.

11. In order to place an uniform mixture of 70% (v/v)sand and 30% (v/v) active material, the volume and the densities of each material will be considered to determine the target feed rate for each product. Samples of the discharged material from the two bin feeder will be routinely obtained to confirm that the desired mixture is being produced. The desired mixture will contain a minimum average of 30% (v/v) and a minimum of 25% (v/v). The feed rates for each hopper will be adjusted to obtain the desired mixture.
12. The method for confirmation testing will consist of screening a sample of the blended mixture and measuring the weight of the undersize material (sand) and the weight of the oversize material (AquaGate+PAC™) to confirm the weight ratio is 3.5 to 1. The 3.5 to 1 ratio was determined by assuming a density of loose sand of 90 lb/cf and a density of AquaGate+PAC™ of 80 lb/cf. Using these bulk densities, the weight ratio for a 70/30 volume mixture was calculated as follows:

    a. Basis-100 cf of mixture
    b. Volume of sand is 70% or 70 cf.
    c. Volume of AquaGate+PAC™ is 30% or 30 cf.
    d. Weight of sand is 70 cf x 90 lb/cf = 6,300 lbs.
    e. Weight of AquaGate+PAC™ is 30 cf x 80 lb/cf = 2,400 lbs.
    f. The weight ratio of the 70% (v/v) sand and 30% (v/v) AquaGate+PAC™ is 6,300 lbs./2,400 lbs. = 2.6:1 (lbs. sand to lbs. AquaGate+PAC™)

13. Each of the feed belts, located at the bottom of the bin feeders, will discharge the sand and AquaGate+PAC™ onto an inclined belt conveyor that feeds the Telebelt.
14. The Telebelt (telescopic/radial belt conveyor) is used to convey and place the combined sand/active material in thin lifts on the cap area. Up to five separate lifts will be placed to obtain a uniformly mixed layer to the target average thickness with adjustments made as necessary. For the high sub-grade areas, up to 3 (2-inch) lifts will be used to install the combined sand/active material layer. A discharge spreader plate will be fitted to the end of the conveyor resulting in low-energy placement.
15. The position of the telebelt discharge will be monitored and controlled by a RTK/GPS receiver located at the end of the Telebelt. DredgePack positioning software will be utilized to monitor and record the belt position during capping operations.
16. Core samples will be taken by GLDD and verified by CH2M Hill to confirm the thickness of the combined sand/active material layer.

5.3 Geotextile Installation

Following placement and acceptance of the sand/AquaGate+PAC™ layer, GLDD will install a single layer of non-woven geotextile over the entire targeted cap area. Due to tidal and current conditions, GLDD proposes to install the geotextile layer and armor stone in unison so as to immediately ballast the material. The material will be installed from the deck barge, which will be fitted with a frame to support the roll of geotextile. This frame will be equipped with a tensioning device to provide tension for proper alignment when the geotextile is deployed from the roll. The geotextile will be extended to the shoreline beyond the dredge cut and anchored in place using spikes or manually held in place and

immediately ballasted with the armor stone. After the shore end of the geotextile has been ballasted, the excess geotextile will be trimmed. Once the shoreline geotextile has been securely ballasted and anchored, the geotextile will continue to be unfurl from the geotextile roll support frame, while the material handler simultaneously places the armor stone on the geotextile material. The armor stone placement will be placed a minimum of 18-inches from the edge of the material to allow for the specified overlap of subsequent panels to be installed that will controlled utilizing GPS positioning.

The installation of the geotextile will be performed without the use of spuds. A combination of anchors/deck winches and tender tugboat control will be utilized for controlled movement perpendicular and parallel to the shoreline. Spuds may be used when the barges are situated outside of the capping area.

5.4 Armor Stone Installation

Two types of Armor stone will be used on the project. 12 inches of Type A armor stone will be used to cap areas that were dredged to the full depth. For high sub-grade cap, 6 inches of Type B armor stone will be used. As stated in Section 5.4, the installation of the armor stone will occur concurrently with the installation of the geotextile. GLDD will employ the use of the Fuchs 380 material handler to transfer the stone from the material barge to the targeted area on the geotextile. The stone will be placed in a controlled manner opening the bucket below the water line and a minimal distance above the geotextile thereby reducing the drop height. The operator will be provided additional guidance from the RTK/GPS system installed on the Fuchs 380 to assist in the installation of the specified layer thickness and location. As with the installation of the geotextile, lateral control will be maintained with use of anchors/deck winches and tender tugboat.

5.5 Habitat Sand Layer Installation

Following the placement and acceptance of the armor stone, GLDD will install an additional sand layer to fill voids within the armor stone resulting in a smooth surface that will be conducive to creation of creature habitats. This layer will be installed utilizing the Telebelt system until a smooth surface is attained. As with prior layers, GLDD will utilize RTK/GPS to assist the operator in placement of the sand.

6.0 Capping Equipment Positioning

Positioning of the capping barge will be done using RTK GPS. Two independent systems will be used, one for positioning of the barge and one for the material handler/Telebelt. All positioning information will be fed to a positioning computer in the cab of the material handler to show the operator in real-time the position of the barge.

Boom and bucket/conveyor positions relative to the material handler/Telebelt will be monitored using a series of 5 ruggedized sensors, for use in capping applications. All positioning information will be interfaced with Hypack DREDGEPACK, the chosen software for the project. This software package will show the operator real-

time the position of the barge, bucket and/or conveyor, and will allow for the operator to see real time multiple views of the capping operation with clear definition of existing and required fill levels.

A tide gauge will be installed on the project site to record and transmit tide levels and seamlessly update the positioning system to account for the variable water levels. The tide gauge will be used as a datum verification tool to continuously confirm proper operation of the RTK GPS vertical levels. Survey data and design capping elevations will be loaded into positioning software as surfaces that will guide the operator during capping. The following list details the positioning equipment to be utilized inclusive of function:

- Trimble SPS361 DGPS with Heading for Barge Positioning
  - GPS unit with radio package, antennas, mounting brackets, cabling, power, and enclosure to wirelessly transmit barge position to operator's cab.
- Trimble SPS855 GPS with Heading for Material Handler Positioning
  - Internal 450-470 MHZ Radio for RTK correction
  - 2 x GPS Antenna - Zephyr Model 2
- Positioning System Computer
  - Operator Viewing and Interface Computer
- Ruggedized angle sensors
  - Account for position of Boom, Stick, Bucket X, and Bucket Y
- Magnetic extension sensor
  - Accounts for relative bucket Open position measurement
- Barge/machine Pitch/Roll Inclinometer System
  - Accounts for lateral movement of barge & machine
- Bucket Rotation Monitoring System
  - Relative bucket rotation measurement using magnetic sensors
- Bucket Pitch/Roll Inclinometer System
  - 2 Ruggedized angle sensors
- Valeport Tide Gauge
  - Pressure transducer based tide monitoring system with radio telemetry

During the course of the project, several quality control checks of various parameters will be performed. Parameters within the quality control program include:

- Positioning systems will be checked each day prior to beginning capping
- An independent tide gauge will be installed near site to verify vertical datum levels
- Tide gauge will be checked and calibrated vs. survey staff / tide board daily
- Capping Operators will be informed daily of quality and performance of works based on data reviews
- All capping data will be automatically recorded and checked against survey data. Recorded data included, but not limited to:
  - XYZ Position of Barge
  - XYZ Position of Bucket
  - Tide level (pressure gauge & RTK levels)

7.0 Cap Thickness Verification Tests

GLDD will be performing the required bathymetric surveying and cap core thickness tests on each layer of the cap. All surveys will be performed in accordance with USACE EM 1110-2-1003 Hydrographic Survey Manual by qualified GLDD Survey Engineering personnel using survey-grade positioning equipment and echo-sounders.

Conditional core samples and check surveys will be performed on a daily basis and the results will be reviewed with Project Management team and equipment operators on a regular basis to ensure that capping tolerances are being met. Should any under or over-capping be observed, corrective actions will include immediate changes in cap installation thickness/number or lifts, followed by a re-survey/re-sample to verify the results of any adjustments.

Placement of cap materials will be monitored as follows:

1. The combined sand/active material layer thickness will be monitored and verified using core sampling.
2. The armor layer thickness will be monitored and verified using settlement plates, installed by others.
3. Post-construction surveys will be conducted via bathymetric surveys and, as needed, by poling or coring for verification of coverage.

The placement accuracy for and tolerance specifications of the sand/active material and armor layers will have been satisfied when the following statistical criterion is demonstrated based on post-sand/active material layer, and post-armor layer and post-habitat layer placement measurements to be conducted by CH2M HILL:

Number of Samples Needed to Document Attainment of Minimum Thickness Requirement

Number of Samples Collected	Number of Samples Needed to Exceed Minimum Thickness	Number of Samples Collected	Number of Samples Needed to Exceed Minimum Thickness
11	11	21	20
12	12	22	21
13	13	23	22
14	14	24	23
15	15	25	23
16	16	26	24
17	17	27	25
18	17	28	26
19	18	29	27
20	19	30	28

Cap Layer Thickness Requirements:

Cap Layer	Minimum Thickness (inches)	Minimum Average Thickness (inches)	Maximum Average Thickness (inches)
Combined Sand/Active	8	10	N/A
Armor – Type A	10	12	N/A
Habitat	Cover armor stone	N/A	N/A
Total Cap Layers (Combined Sand/Active + Armor + Habitat)	N/A	N/A	24

Modified Cap Layer Thickness Requirements (High Subgrade Areas):

Cap Layer	Minimum Thickness (inches)	Minimum Average Thickness (inches)	Maximum Average Thickness (inches)
Combined Sand/Active	4	6	N/A
Armor	4.5	6	N/A
Habitat	Cover armor stone	N/A	N/A

At the conclusion of the capping, all capped areas will have been surveyed in conjunction with the PLS allowing for as-builts to be generated by GLDD with the NJ licensed/registered surveyor's approval.

The following list of equipment will be utilized for the performance of the surveying:

Positioning

- Horizontal & Vertical: Trimble SPS855 RTK Receiver

Soundings

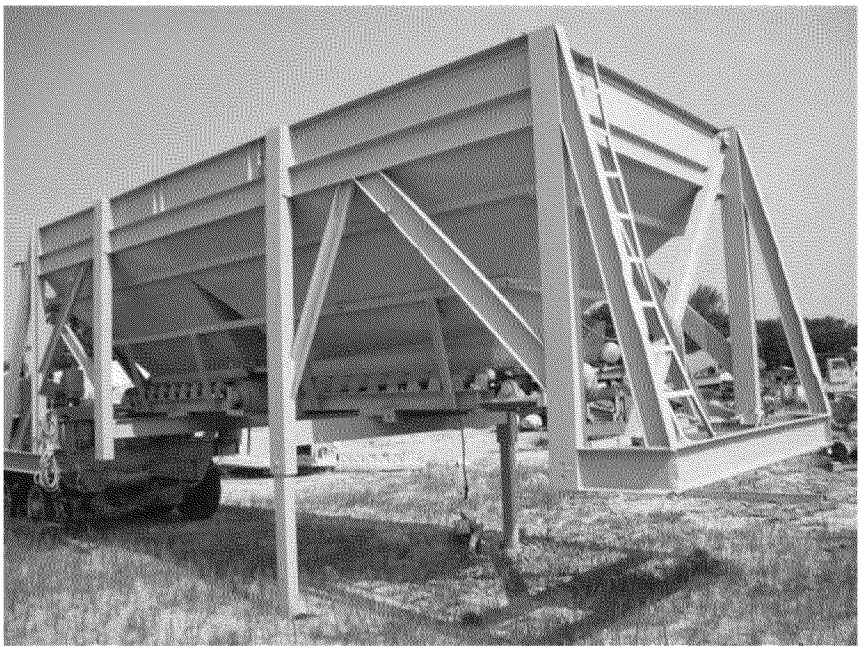
- Single Beam, High Frequency – 200Khz
- ODOM Hydrotrac Echo sounder

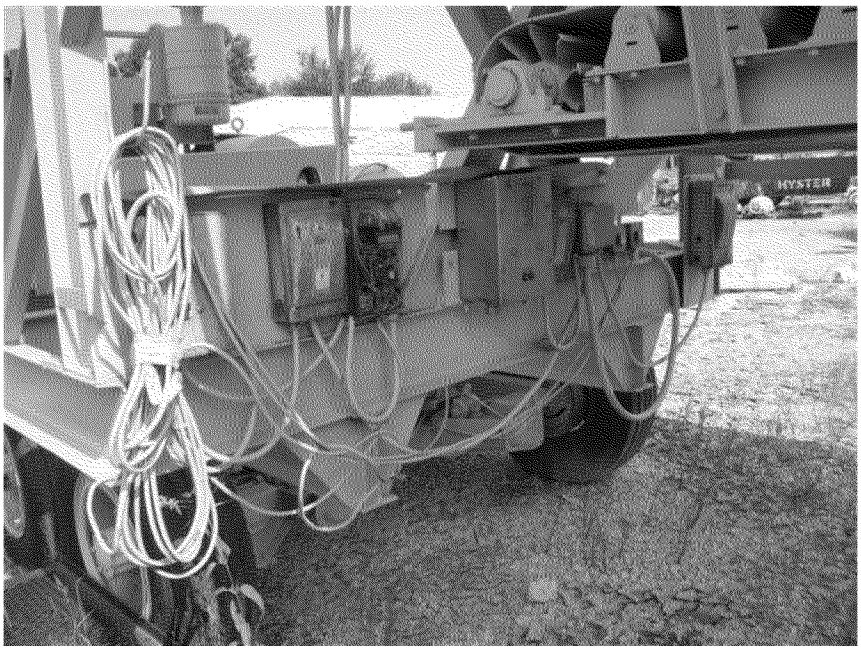
8.0 Demobilization

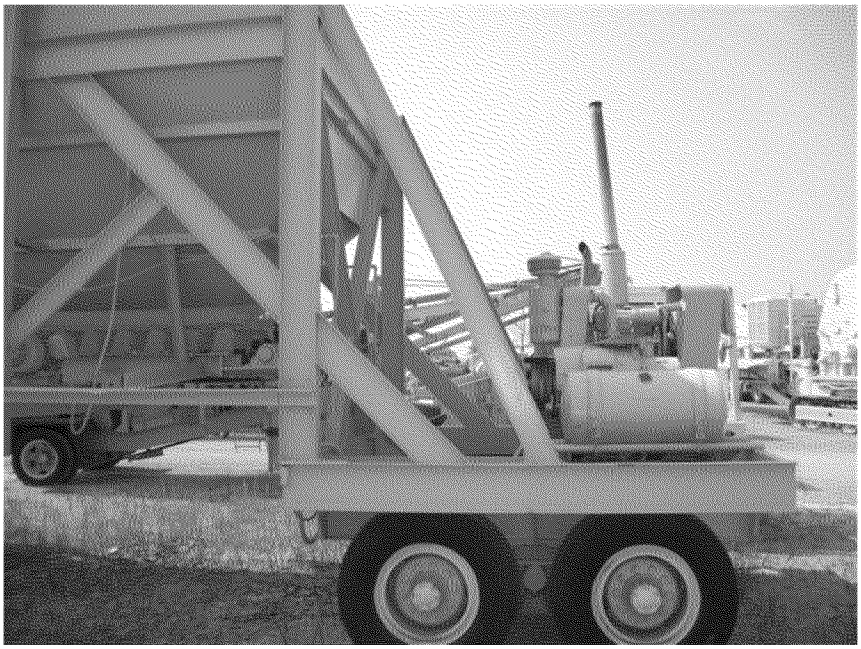
Following the completion of the capping operations, all equipment utilized for the performance of the work will be demobilized and transported to their respective origins for dismantling and/or return to inventory/vendor.

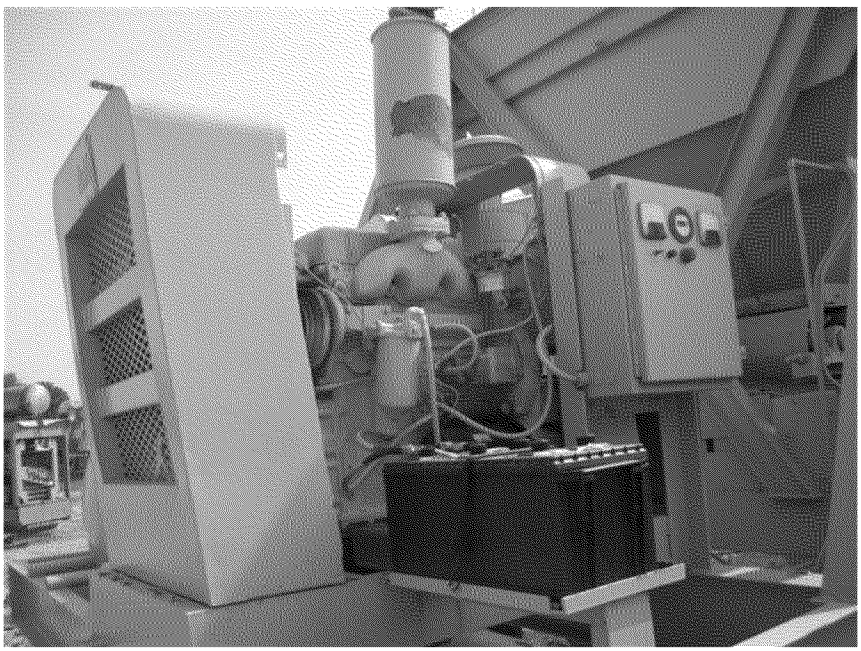
APPENDIX 1.0

Two bin Feeder with adjustable slide gates to adjust feed rate










WEEKS MARINE ABS DECK BARGE
WEEKS 508
WEEKS 290
NEW YORK, N.Y.
WEEKS 186
NEW YORK,NY

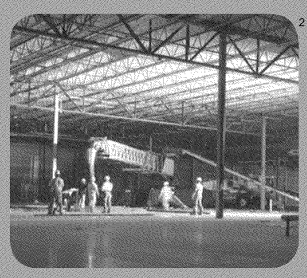
Telebelt® TB 130

Telescopic Belt Conveyor

Putzmeister

- Places materials from sand to 4" (100mm) rock
- Smooth surge-free conveying results
- Sets up under low 15' 4" (4.70m) heights
- 126' 6" (38.56m) horizontal reach

Putzmeister
TELEBELT
ADVANTAGE


2

Low Clearance Projects

With extremely low unfolding heights and the ability to be moved rapidly, Putzmeister Telebelts can be set up and operated on jobs with height restrictions such as warehouse slabs. Material can be conveyed long distances in an enclosed structure, under bridges and into limited access structures.


3

Handles Various Materials

In addition to handling aggregates from rock to sand with ease, a Telebelt conveys a multitude of concrete mix designs. Separation and loss of air entrainment are not an issue with conveyed concrete. This makes them a great choice for critical mix designs.


4

Saves Time & Labor

Need to place gravel and concrete on the same site in the same day? Telebelts can perform multiple tasks from a single location. Quick setup and tear down as well as the ability to place material at high volumes enable you to complete more jobs with less manpower. Tedious tasks once requiring multiple trips with other equipment are eliminated.

Telebelt® TB 130

Telescopic Belt Conveyor Standard Features

TELEBELT Putzmeister

Boom

- 126' 6" (38.56m) horizontal reach
- Low 15' 4" (4.70m) unfolding height
- Five-section telescopic boom with third and fourth boom section synchronization
- Steel/aluminum base with four telescopic high strength aluminum sections
- Single control lever to extend/retract all boom sections
- Maintenance free sealed roller bearings
- Quick telescoping feature
- 360° hydraulic rotation

Main Conveyor

- 18" (457mm) 3-ply nylon cord vulcanized spliced belt with hot melt and no staples or mechanical splices
- Maximum rated 360 cubic yards an hour (275m³/hr)
- Infinitely variable belt speed control from 0 to 100%
- Spring-tensioned carbide scraper system
- Active independent control of the feed and main conveyor systems

Feeder Belt

- 38' (11.60m) aluminum independent hydraulic feed conveyor
- 360° hydraulic rotation allowing material to be loaded from any position desired
- 18" (457mm) belt can be fed by a ready mix truck, dump truck, skid-steer loader or front-end loader
- UHMW polyethylene integrated folding feeder hopper handles the toughest mixes
- Spring-tensioned carbide scraper system

Boom Control & Operation

- Main conveyor functions controlled by Modular Boom Control (MBC) system
- Single-section maintenance without removing entire valve assembly
- Ergonomic and lightweight standard proportional radio remote control
- Independent belt speed control for main and feed conveyors
- 100' (30m) proportional cable remote included
- Manual control backup for all functions

Trunk/End Hose

- Standard 8" (200mm) and 12" (305mm) tremie reducers – each with 15' (4.57m) end hoses and chain binder

Material Handling

- Handles harsh concrete mixes of any slump consistently
- No special mix requirements
- Places any type of flowable material

Power

- Driven by two full horsepower rated air shift rear PTOs from the Mack MR 688S 400 hp (300kW) engine
- Low engine RPM and 175 hp (130kW) for reduced fuel costs

Outriggers

- Patented outriggers hydraulically telescope out and extend down
- Quick and easy setup in congested areas
- Sets up on solid or rough terrain

Clean Out

- Requires only water to clean feeder hopper and belt
- High pressure 2,500 psi (173 bar) hydraulically-drivenpressure washer system
- Large capacity 170 gallon (644L) water tank

Additional Standard Features

- Aluminum diamond deck
- Large side-mounted aluminum tool boxes
- Emergency stop buttons
- High quality paint finish
- Operators manuals and ship-away kit

Available Options

- Rock hopper
- Front-end loader hopper
- Low profile hopper
- Side loading channels
- Oil/water tank heaters
- Custom paint schemes

Consult factory for options not listed.

Putzmeister PRO-VANTAGE® WARRANTY PLAN

5

The PRO-VANTAGE® Warranty Plan extends the coverage on all Putzmeister Telebelts for a total of 36 months or 6,600 hours at no extra charge.


6

Use Your Imagination!

Telebelts are ideal for countless applications including:

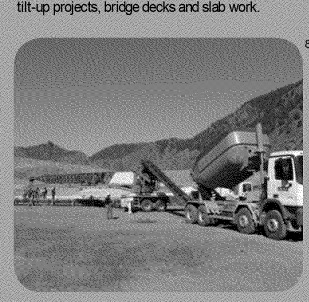
Tilt-Up Panels	Mat Pours	Slope Paving	Landscaping
Basements	Backfill	Low Height Areas	Dams
Foundations/Footings	Bridge Decks	Slabs	Environmental Projects

Putzmeister
TELEBELT
ADVANTAGE


7

Placement Versatility

A Telebelt offers a quick way to easily clear obstacles and place material exactly where you want it without the need for all-wheel drive mixer trucks, skid-steer loaders or other equipment. Ideal for maneuvering around a variety of job sites including mat pours, backfilling, tilt-up projects, bridge decks and slab work.


8

A Cleaner, More Efficient Site

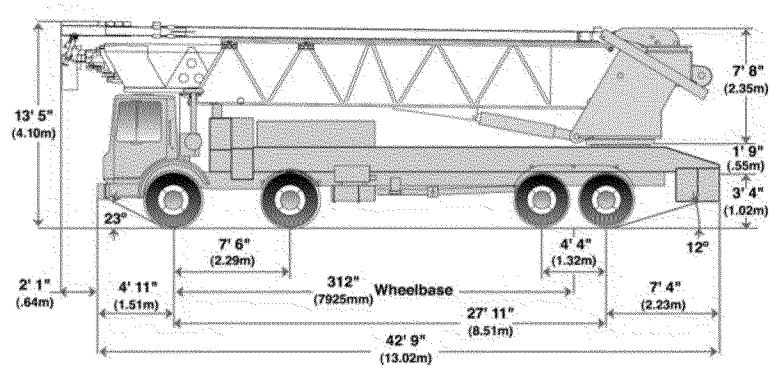
Telebelts do not require priming and all material can be run off the belts eliminating waste. A highly efficient spring-tensioned carbide scraper system helps to keep job sites clean.

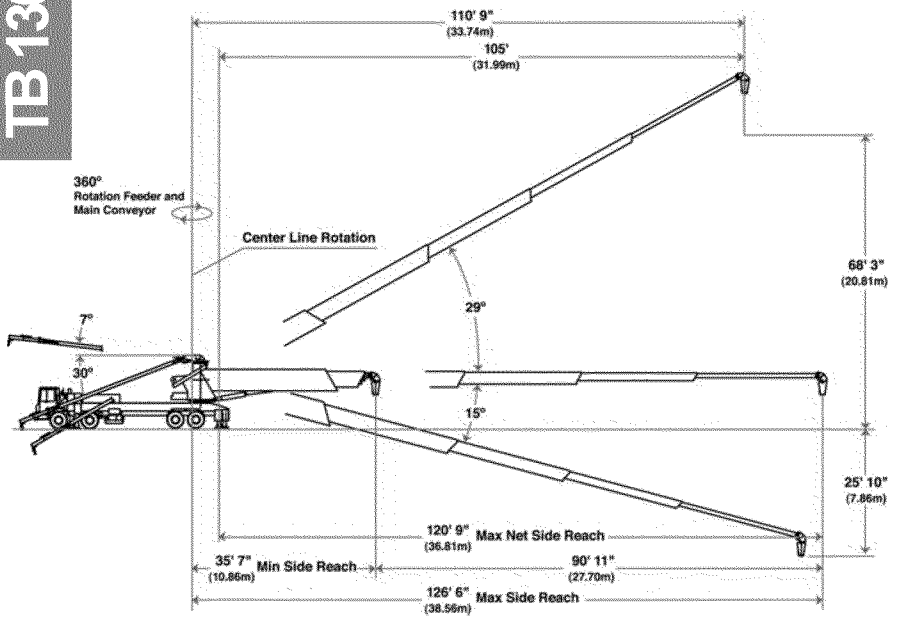

9

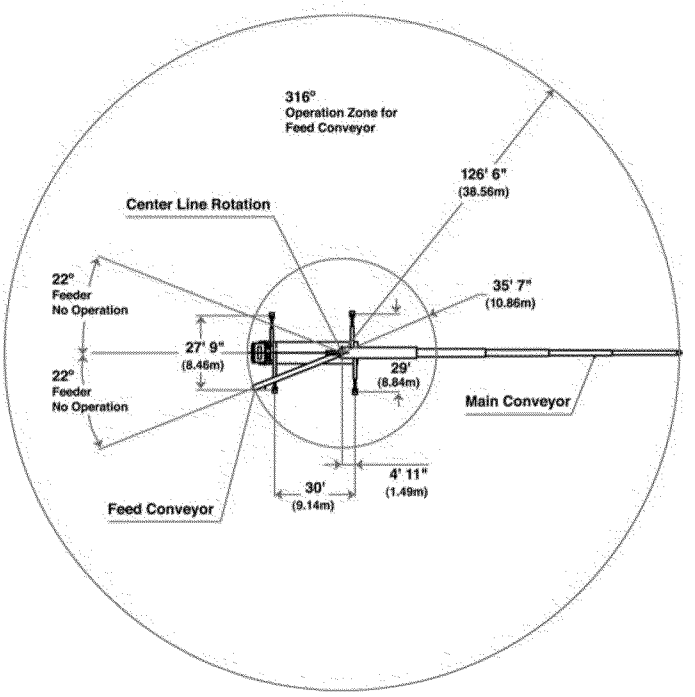
Setup Convenience

An integral part of the feed conveyor, the folding hopper makes setup a breeze. Side panels fold into the feed conveyor and end panels connect with linchpins. The belt can then be easily fed with a ready mix truck from three sides. Optional hoppers are also available for use with a skid-steer loader, front-end loader or coal chute.

TB 130







Photos and drawings are for illustrative purposes only.

Conveyors

Conveyor horizontal reach		
Maximum at 0°	126' 6"	(38.56m)
Maximum at 29°	110' 9"	(33.74m)
Conveyor belt width	18"	(457mm)
Feed conveyor length	38'	(11.60m)
Feed conveyor belt width	18"	(457mm)
Trunk/end hose length	15'	(4.57m)
Discharge height from grade		
Maximum at 29°	68' 3"	(20.81m)
Maximum at -15°	-25' 10"	(-7.86m)
Rated capacity at 0°	6 yd^3/min	(4.60m^3/min)
main & feed conveyors	360 yd^3/hr	(275m^3/hr)
Rated capacity up to 20°	3.80 yd^3/min	(2.90m^3/min)
main & feed conveyors	230 yd^3/hr	(175m^3/hr)

Maximum theoretical values listed

Outriggers

Net reach beyond outriggers		
at 0°	120' 9"	(36.81m)
at 29°	105'	(31.99m)
Outrigger spread		
front, hydraulic extend out/down	27' 9"	(8.46m)
rear, hydraulic extend out/down	29'	(8.84m)

General Specifications

Water tank capacity	170 gal	(644L)
Hydraulic oil tank capacity		
with cooler	130 gal	(492L)

Truck Specifications* +

Weight	22,020 lbs	(9,987kg)
Engine horsepower	400 hp	(300kW)
Wheelbase	312"	(7,925mm)
Cab height	104"	(2,642mm)
Steering radius (outside)	45' 6"	(13.87m)
Steering angle	38°	
Fuel tank capacity	80 gal	(416L)
Transmission	Mack T309LR 9-Speed	

Transport Axle Weights* +

Steering	33,081 lbs	(15,003kg)
Tandem	43,237 lbs	(19,609kg)
Total	76,318 lbs	(34,612kg)

* Truck dimensions will vary with different truck makes, models and specifications. Weights are approximate and include conveyor truck, full hydraulic oil, fuel, driver and 100 gal (379L) of water.

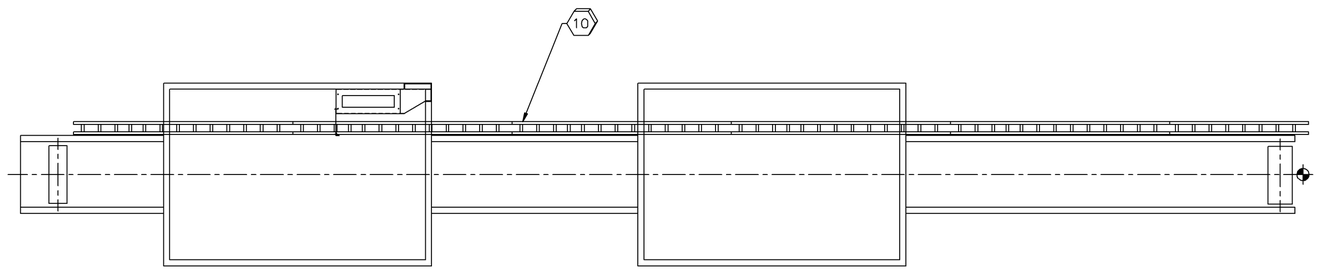
+ All specifications apply to units mounted on Mack MR 688S.

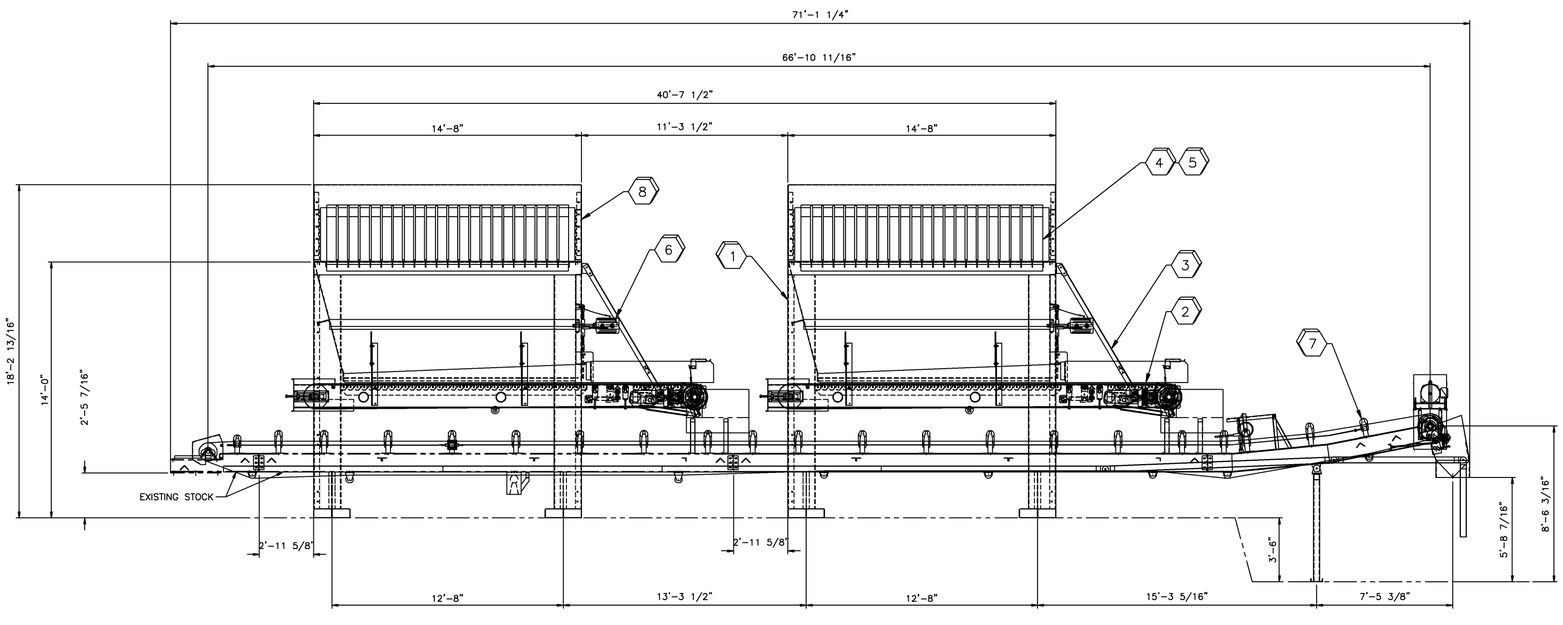
Putzmeister America, Inc.
1733 90th Street
Sturtevant, WI 53177 USA
Telephone (262) 886-3200
(800) 884-7210
Facsimile (262) 884-6338
www.putzmeister.com

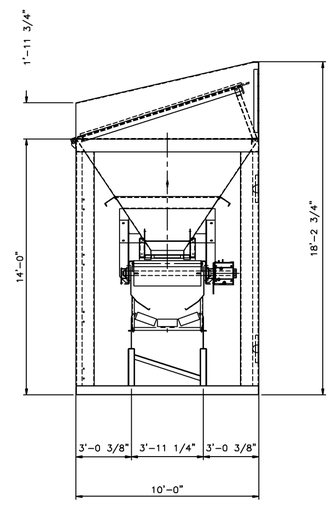
QUALITY SYSTEM CERTIFIED ISO 9001:2000

Authorized Distributor

ITM	QTY	PART NO	RAW	DESCRIPTION	WEIGHT
XXX	XXX	FB005520A.00		2-BIN RAP ELEVATION	41619.97
1	2	FB005521A.00		RH 10'X14'-8" RAP BIN ASSM	15285.71
2	2	FB001998A.00		RH LOAD 42" WEIGH BF ASSEMBLY	9569.88
3	2	FB002038A.00		FEEDER HANGER ASSEMBLY	206.71
4	2	FB000097A.00		GRIZZLEY 6" SLOTTED	5623.22
5	6	FB000104A.00		GRIZZLEY SUPPORT	196.94
6	2	FB005537A.00		RAP BIN AIR CANNON - 10' X 14'-8"	126.22
7	1	CV009540A.00		36" CONVEYOR ASSEMBLY	7302.4
8	2	FB001269A.00		10X14-8 SLOPED RAP BIN DIV ASSY	3113.35
9	1	FB005555A.00		DECAL LIST	0
10	1	CT001035A.00		2 BIN RAP CABLE TRAY ASSY	123.9
11	1	EL000045A.00		2 BIN RAP CONDUIT & JBOX LAYOUT	71.63







A 9 11

2-BIN RAP ELEVATION

THIS DRAWING OWNED BY:

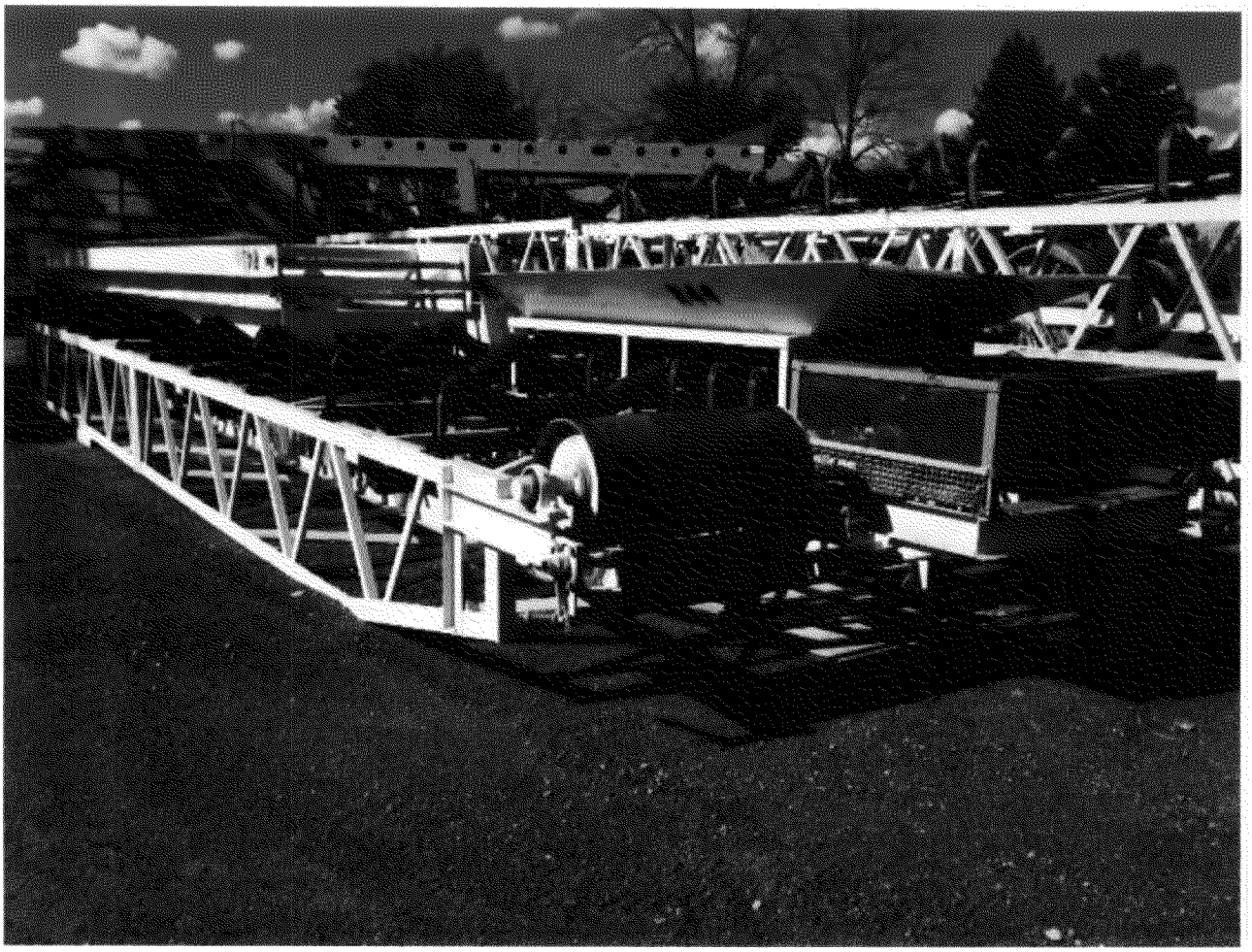
DILLMAN®
A Division of Astec, Inc.
34600 COUNTY HIGHWAY K
Prairie du Chien, WI 53821

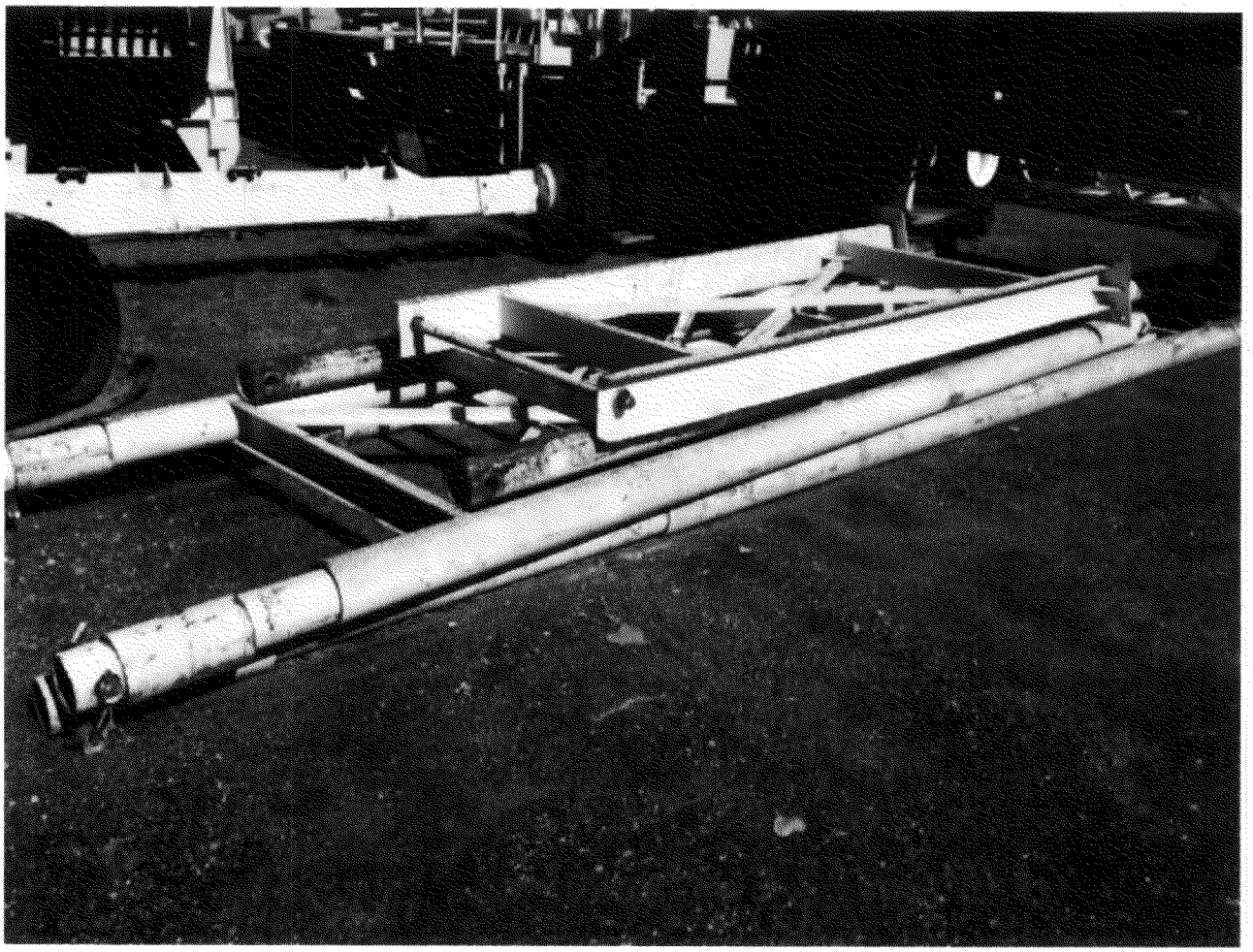
NO	REVISION	APPR	BY	DATE
RELEASE INFORMATION				

PART NAME: **2-BIN RAP ELEVATION**
MACHINE: **10' X 14'-8 RAP BIN W/42" WEIGH FEEDER**

DWN: **LARRY FRIEDLEIN** | CHKD | APPR

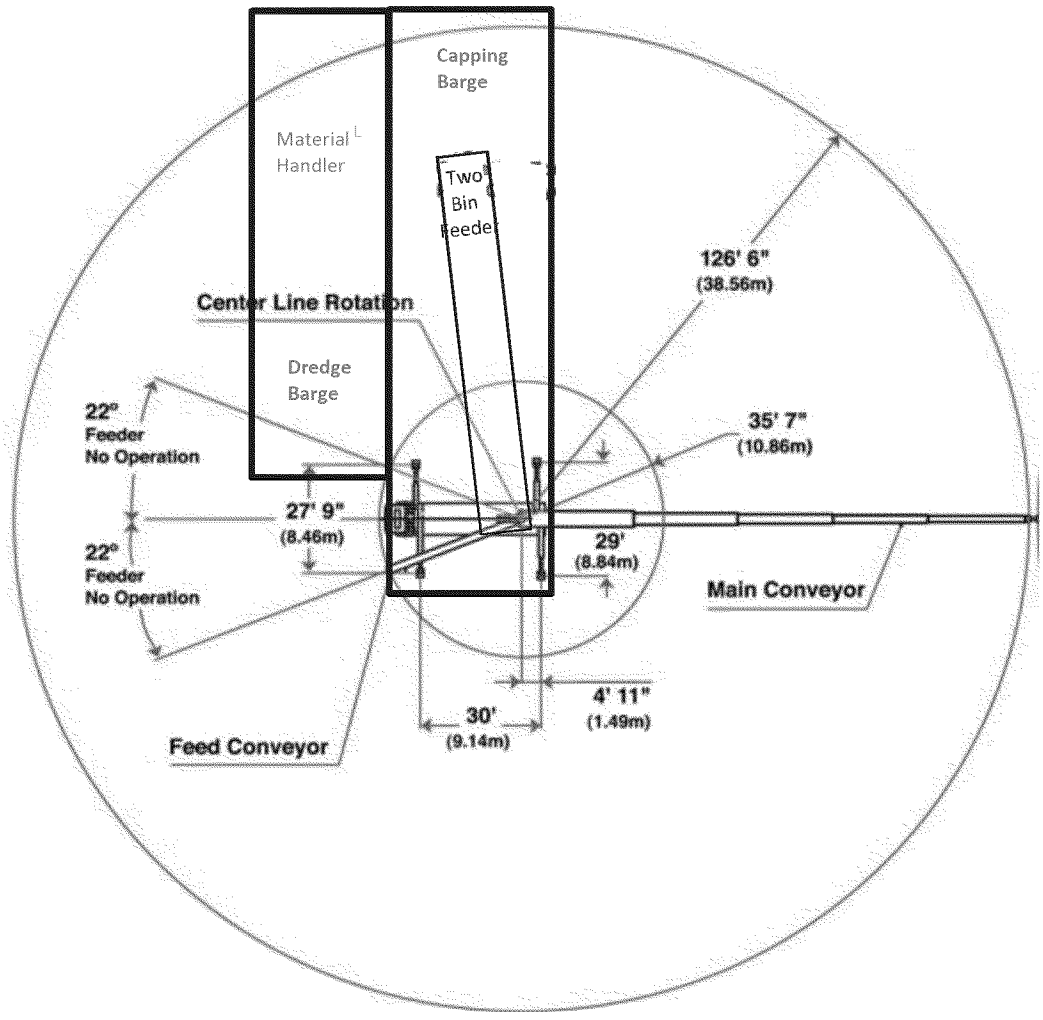
DATE	SHEET	SCALE	DWG NO	REV
09/24/2012	1 OF 1	1/4" = 1'-0"	FB005520A	00

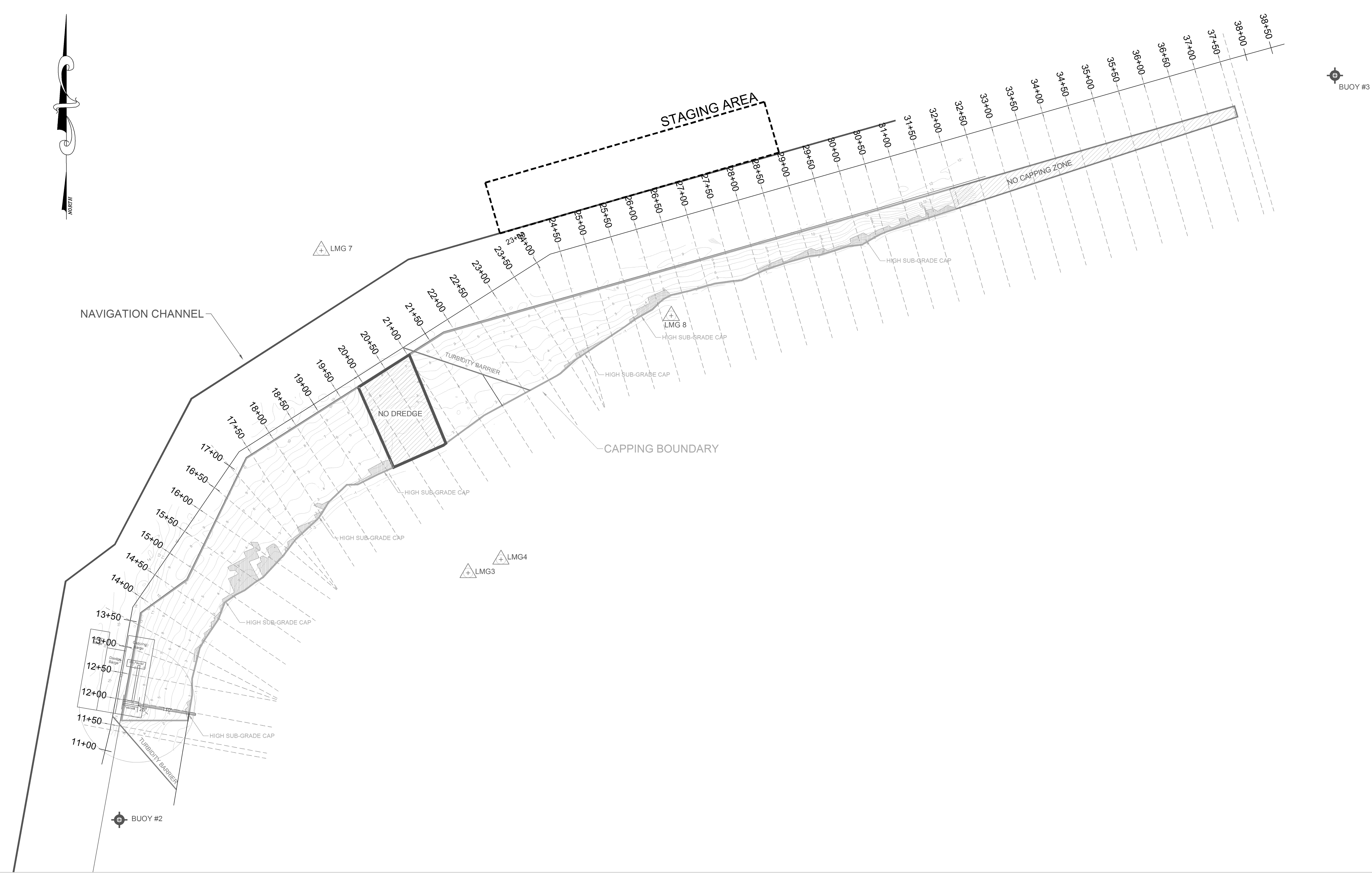




Attachment 1.0

PRELIMINARY CAPPING EQUIPMENT LAYOUT





NOTES:
1. DEPTH CONTOURS IN NGVD29
2. 0.00 MLW = -1.811 NGVD29 @ BELLEVILLE, NJ
3. HYDROGRAPHIC AND TOPOGRAPHIC DATA COLLECTED BY GLDD ON AUG 28- OCT 4

GRAPHIC SCALE
(IN FEET)
1 inch = 80 ft.

OPERATOR / CONDITIONS	
SURVEY DATE:	AUG 28 - OCT 4
ENGINEER / SURVEYOR:	JM, MP, CE
SURVEY VESSEL:	THE NEWARK BAY
VESSEL OPERATOR:	JC
WEATHER:	VARIES
TEMPERATURE:	VARIES
WIND:	VARIES
SEA:	0 FEET

ELECTRONIC EQUIPMENT	
FATHOMETER:	ODOM HYDROTRAC
FREQUENCY(s):	200 KHZ
HEAVE COMP.:	N/A
SOS (AVG):	VARIES
POSITIONING:	TRIMBLE 855 RTK
BASE LOCATION:	WBA.7
TIDE GAUGE:	N/A
	RTK TIDE USED

PROJECT DETAILS	
HORIZONTAL DATUM:	NAD83
LOCAL GRID:	NEW JERSEY
VERTICAL DATUM:	NGVD29
UNITS HORIZ. / VERT.:	US SURVEY FT
SURVEY/PROJ. CONTROL POINT:	X=
	Y=
	Z=
SURVEY/PROJ. BENCH MARK:	X=
	Y=
	Z=
TIDE STAFF LOCATION:	DEJESSA BRIDGE

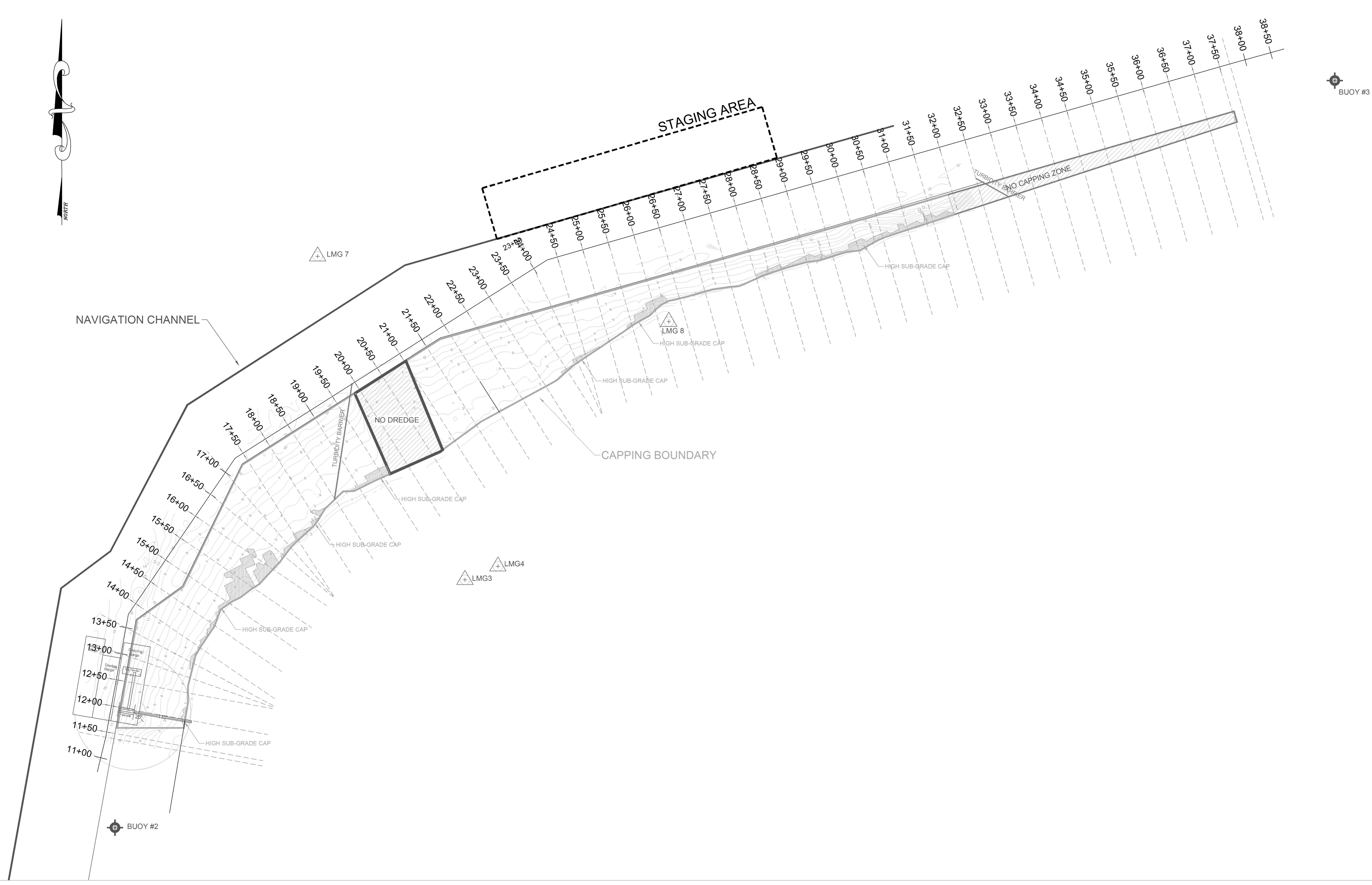
01

APPROVED BY: J. MILLER
DESIGNED BY: J. MILLER
USACE PERMIT NO: NA
GLDD JOB NO.: 15368
DATE: OCT. 21, 2013
SCALE: 1:80

PROJECT
LOWER PASSAIC RIVER, NJ
STUDY AREA PROJECT, RIVER MILE 10.9

TITLE/SURVEY TITLE
ATT. 2.0-CAPPING LAYOUT-SOUTH NO DREDGE

GREAT LAKES DREDGE AND DOCK COMPANY, LLC
2122 York Road Oak Brook IL 60521
Phone: 630 574-3000 Fax: 630 574-1515



NOTES:
1. DEPTH CONTOURS IN NGVD29
2. 0.00 MLW = -1.811 NGVD29 @ BELLEVILLE, NJ
3. HYDROGRAPHIC AND TOPOGRAPHIC DATA COLLECTED BY GLDD ON AUG 28- OCT 4

GRAPHIC SCALE

80 0 40 80 160 320

(IN FEET)
1 inch = 80 ft.

01

J. MILLER

J. MILLER

NA

15368

OCT. 21, 2013

1:80

PROJECT
LOWER PASSAIC RIVER, NJ
STUDY AREA PROJECT, RIVER MILE 10.9

TITLE/SURVEY TITLE
ATT. 2.0-CAPPING LAYOUT-NORTH NO DREDGE

GREAT LAKES DREDGE AND DOCK COMPANY, LLC
2122 York Road Oak Brook IL 60521
Phone: 630 574-3000 Fax: 630 574-1515

FOIA_07123_0002320_0028

ATTACHMENT 3.0

AquaGate+PAC

AquaGate+PAC™

Background

AquaGate+PAC (Powdered Activated Carbon) is a patented, composite-aggregate technology resembling small stones typically comprised of a dense aggregate core, clay or clay-sized materials, polymers, and fine-grained activated carbon additives.

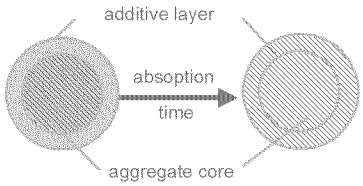


Figure 1. Configuration of PAC-coated particle.

AquaGate+PAC serves as a delivery mechanism to reliably place reactive capping materials into aquatic environments.

Product Specifications

Aggregate:	Nominal AASHTO #8 (1/4-3/8") or custom-sized to meet project-specific need * Limestone or non-calcareous substitute, as deemed project-appropriate
Clay:	Bentonite (or montmorillonite derivative) ** Typically 5 – 10% by weight*
Activated Carbon:	Powdered – Iodine Number 800 mg/g (minimum) » 99% (minimum) through 100 mesh sieve » 95% (minimum) through 200 mesh sieve » 90% (minimum) through 325 mesh sieve ** Typically 2 – 5% by weight*
Binder:	Cellulosic polymer
Permeability:	1×10^{-1} to 1×10^{-2} cm/sec
Dry Bulk Density:	70 – 90 lbs/ft^3

AquaBlok® Composite Particle System

For more information, Contact AquaBlok, Ltd. at:

Phone: (800) 688-2649
Email: services@aquablokinfo.com visit us at our
Web: www.aquablokinfo.com

Last Revised: January 1, 2010

ATTACHMENT 4.0

SKAPS Industries (Nonwoven Division)
335, Athena Drive
Athens, GA 30601 (U.S.A.)
Phone (706) 354-3700 Fax (706) 354-3737
E-mail: info@skaps.com

Sales Office:
Engineered Synthetic Product Inc.
Phone: (770)564-1857
Fax: (770)564-1818

October 7, 2013
Iwt/Cargo-Guard
P.O. Box 454
Waretown, NJ 08758
Ref : Great Lakes Dredge & Dock C/o Passaic River Project
PO : 17718

Dear Sir/Madam:

This is to certify that SKAPS GE112 is a high quality needle-punched nonwoven geotextile made of 100% polypropylene staple fibers, randomly networked to form a high strength dimensionally stable fabric. SKAPS GE112 resists ultraviolet deterioration, rotting, biological degradation. The fabric is inert to commonly encountered soil chemicals. Polypropylene is stable within a pH range of 2 to 13. SKAPS GE112 conforms to the property values listed below:

PROPERTY	TEST METHOD	UNITS	M.A.R.V. Minimum Average Roll Value
Weight	ASTM D 5261	oz/sy (g/m^2)	12.00 (407)
Thickness*	ASTM D 5199	mils (mm)	120 (3.05)
Grab Tensile	ASTM D 4632	lbs (kN)	330 (1.47)
Grab Elongation	ASTM D 4632	%	50
Trapezoidal Tear	ASTM D 4533	lbs (kN)	125 (0.56)
Puncture Resistance	ASTM D 4833	lbs (kN)	190 (0.85)
Mullen Burst Strength	ASTM D 3786	psi (kPa)	625 (4309)
Permittivity*	ASTM D 4491	sec^{-1}	0.90
Permeability*	ASTM D 4491	cm/sec	0.30
Water Flow*	ASTM D 4491	gpm/ft^2(l/min/m^2)	70 (2852)
AOS*	ASTM D 4751	US Sieve (mm)	100 (0.15)
UV Resistance	ASTM D 4355	%/hrs	70/500

Notes:
* At the time of manufacturing. Handling may change these properties.

PALAK PATEL
QUALITY CONTROL MANAGER

Product : GE112-180

ROLL # ASTM METHOD UNITS TARGET	WEIGHT D5261 oz/sq yd 12.00	THICKNESS D5199 (mils) 120	MD TENSILE D4632 lbs. 330	MD ELONG D4632 % 50	XMD TENSILE D4632 lbs 330	XMD ELONG D4632 % 50	MD TRAP D4533 lbs. 125	XMD TRAP D4533 lbs 125	PUNCTURE D4833 lbs. 190	MULLEN D3786 psi 625	AOS D4751 US Sieve 100	WATER FLOW D4491 gpm/ft^2 70	PERMEABILITY D4491 cm/sec 0.30	PERMITTIVITY D4491 sec^{-1} 0.90
31678.01	12.65	131	342	78	363	87	136	152	198	631	100	73	0.33	0.98
31678.02	12.65	131	342	78	363	87	136	152	198	631	100	73	0.33	0.98
31678.03	12.65	131	342	78	363	87	136	152	198	631	100	73	0.33	0.98
31678.04	12.65	131	342	78	363	87	136	152	198	631	100	73	0.33	0.98
31678.05	12.24	124	337	71	355	82	136	152	198	631	100	73	0.33	0.98
31678.06	12.24	124	337	71	355	82	136	152	198	631	100	73	0.33	0.98
31678.07	12.24	124	337	71	355	82	136	152	198	631	100	73	0.33	0.98
31678.08	12.24	124	337	71	355	82	136	152	198	631	100	73	0.33	0.98
31678.09	12.24	124	337	71	355	82	136	152	198	631	100	73	0.33	0.98
31678.10	12.58	128	344	76	361	89	131	147	190	628	100	73	0.33	0.98
31678.11	12.58	128	344	76	361	89	131	147	190	628	100	73	0.33	0.98
31678.12	12.58	128	344	76	361	89	131	147	190	628	100	73	0.33	0.98
31678.13	12.58	128	344	76	361	89	131	147	190	628	100	73	0.33	0.98
31678.14	12.58	128	344	76	361	89	131	147	190	628	100	73	0.33	0.98
31678.15	12.31	122	339	74	352	83	131	147	190	628	100	73	0.33	0.98
31678.16	12.31	122	339	74	352	83	131	147	190	628	100	73	0.33	0.98
31678.17	12.31	122	339	74	352	83	131	147	190	628	100	73	0.33	0.98
31678.18	12.31	122	339	74	352	83	131	147	190	628	100	73	0.33	0.98
31678.19	12.31	122	339	74	352	83	131	147	190	628	100	73	0.33	0.98
31678.20	12.64	130	341	79	364	86	139	154	196	633	100	73	0.33	0.98
31678.21	12.64	130	341	79	364	86	139	154	196	633	100	73	0.33	0.98
31678.22	12.64	130	341	79	364	86	139	154	196	633	100	73	0.33	0.98
31678.23	12.64	130	341	79	364	86	139	154	196	633	100	73	0.33	0.98
31678.24	12.64	130	341	79	364	86	139	154	196	633	100	73	0.33	0.98
31678.25	12.42	125	335	72	357	80	139	154	196	633	100	73	0.33	0.98
31678.26	12.42	125	335	72	357	80	139	154	196	633	100	73	0.33	0.98
31678.27	12.42	125	335	72	357	80	139	154	196	633	100	73	0.33	0.98

*All values are MARV.

Product : GE112-180

ROLL # ASTM METHOD UNITS TARGET	WEIGHT D5261 oz/sq yd 12.00	THICKNESS D5199 (mils) 120	MD TENSILE D4632 lbs. 330	MD ELONG D4632 % 50	XMD TENSILE D4632 lbs 330	XMD ELONG D4632 % 50	MD TRAP D4533 lbs. 125	XMD TRAP D4533 lbs 125	PUNCTURE D4833 lbs. 190	MULLEN D3786 psi 625	AOS D4751 US Sieve 100	WATER FLOW D4491 gpm/ft^2 70	PERMEABILITY D4491 cm/sec 0.30	PERMITTIVITY D4491 sec^{-1} 0.90
31678.28	12.42	125	335	72	357	80	139	154	196	633	100	73	0.33	0.98
31678.29	12.42	125	335	72	357	80	139	154	196	633	100	73	0.33	0.98
31678.30	12.49	133	343	77	359	88	134	149	193	626	100	73	0.33	0.98
31678.31	12.49	133	343	77	359	88	134	149	193	626	100	73	0.33	0.98

*All values are MARV.

ATTACHMENT 5.0

Armor Stone Type A
Armor Stone Type B
Sand
Geotextile
Active Mixture

Cap
Cy Cap

Lifts Completed	
Today	xxxx

Area (SF)	
Today	xxxx
Total	xxxx

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ATTACHMENT 6.0

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- Table 1. CapSim Model Sensitivity Evaluation

RM 10.9 Removal Action – High Sub-grade Cap Design

Darcy Velocity (cm/yr)	Total Active Layer Thickness (inches)	AquaGate Thickness (inches)	Sand Thickness (inches)	AquaGate Volume (% volume)	Time to Breakthrough (years)
307	10	3	7	30	> 250
307	8	2.4	5.6	30	>250
307	6	1.8	4.2	30	>250

307	4	1.2	2.8	30	179
307	3	2.4	0.6	80	>250
307	2.5	2.5	0	100	> 250
307	2	1.6	0.4	80	136
307	2	2	0	100	172
154	2	1.8	0.2	90	>250
154	2	2	0	100	> 250
154	1	1	0	100	78
77	2	1.2	0.8	60	> 250
77	1	1	0	100	122

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